

Appendix 5: Miscellaneous Data from San Francisco Volcanic Field.

5.1. Area and volume of San Francisco volcanic field:

Area occupied by vent structures. Excludes distal ends of some lava flows and outlying vent structures like Shadow Mountain.

2,045 mi², 0.41 vents/mi² 5,300 km², 0.16 vents/km²

Volume of erupted volcanic material estimated to be about 500 km³.

5.2. Number of small monogenetic and polygenetic vent structures in San Francisco volcanic field:

Excludes the five large centers of intermediate and silicic rocks (San Francisco Mountain volcanic system, O'Leary Peak, Bill Williams Mountain, Sitgreaves Mountain, Kendrick Peak).

Mapped and analyzed monogenetic vent structures on the five MF-series maps: 427

Mapped and analyzed polygenetic vent structures on the five MF-series maps: 98
(polygenetic structures have two or more different lithologies)

Mapped but not analyzed vent structures on the five MF-series maps: 107

Total mapped small monogenetic and polygenetic structures on the five MF-series maps: 632

Mapped but not analyzed vent structures south and west of the boundaries of the MF-series maps: 58

Inferred vent structures on 7.5' maps south and west of the boundaries of the MF-series maps: 143

Total small monogenetic and polygenetic vent structures: 833

5.3. Number of chemical analyses on the five MF-series maps:

Analyses of lavas, dikes, bombs: 1,147

Analyses of xenoliths 39

Total analyses 1,186

Analyses on MF maps linked to specific small monogenetic and polygenetic vent structures. 653
(Duplicate analyses of the same composition in a vent structure are not included in count).

San Francisco Mountain and basal silicic centers. 160

O'Leary Peak silicic center. 15

Bill Williams Mountain, Sitgreaves Mountain, Kendrick Peak. 66

Analyses on MF maps for which vent is unknown. 123

Duplicate analyses on MF maps of the same analyzed feature. 130

Total analyses. 1,147

5.4. Compositions of features on the five MF-series maps linked to known small monogenetic and polygenetic vent structures.

1. MF-series maps: MF-1956, MF-1957, MF-1958, MF-1959, MF-1960.
2. Features include: lava flows, dikes, bombs.
3. Data are exclusive of the five large intermediate and silicic centers (Bill Williams Mountain, Sitgreaves Mountain, Kendrick Peak, San Francisco Mountain and basal silicic centers, and O'Leary Peak).
4. CIPW norm symbols: ne: nepheline, hy: hypersthene, Q: quartz, ol: olivine.
5. K: potassium

ROCK COMPOSITION	ANALYSES	NUMBER	PERCENT
MELANEPHELINITE and BASANITE*		8	1.2
Melanephelinite	2		
Basanite	6		
BASALT** (% of basalts)		400	61.3
Basanitic alkali basalt (8.8%)	35		
Alkali basalt (44.0%)	176		
Transitional basalt (25.5%)	102		
Subalkali basalt (20.8%)	83		
Q-subalkali basalt (1.0%)	4		
TRACHYBASALT		94	14.4
ne-hawaiite	43		
ol-hy-hawaiite	40		
ne-K-trachybasalt	7		
ol-hy-K-trachybasalt	4		
BASALTIC TRACHYANDESITE		65	10.0
ne-mugearite	9		
ol-hy-mugearite	37		
Q-mugearite	8		
ne-shoshonite	2		
ol-hy-shoshonite	7		
Q-shoshonite	2		
BASALTIC ANDESITE		29	4.4
ol-hy- and Q-basaltic andesite	29		
TRACHYANDESITE		26	4.0
ol-hy- and Q-benmoreite	16		
Q-Latite	10		
ANDESITE		8	1.2
Q-Andesite	8		
TRACHYTE		10	1.5
Q-Trachyte	10		
DACITE		1	0.2
Dacite	1		
RHYOLITE		12	1.8
Rhyolite (Ca-plagioclase bearing)	10		
Alkali feldspar rhyolite	1		
Peralkaline rhyolite	1		
Total monogenetic and polygenetic vent analyses	653	653	100

*Melanephelinite and basanite samples plot in the low alkali part of the basanite field on the TAS diagram.
melanephelinite: norm ab<5, norm ne<20.

basanite: norm ab>5, norm ne 5-20.

**See Table 8 page 28 for classification criteria of basalts.

5.5a. Primitive lavas on MF-1956, MF-1957, MF-1958, MF-1959, MF-1960 in San Francisco volcanic field:

1. $mg = 100Mg/(Mg + Fe)$ in the range 65 to 72, where $Fe = \text{total iron as FeO}$.
($mg = 65-72$ is roughly equal to 68-75 where $Fe^{2+} = 0.85$ total iron as FeO)
2. $\%An = 100An/(Ab + An) \geq 50$.
3. "primitive" is used as a descriptive term.

SP SHEET SPECIMENS	VENT	mg	MgO	%An	SiO2	MAP SYMBOL	TYPE*	CHEMICAL LITHOLOGY
5711A	5712	66	11.31	58	46.58	Qbb	d	alkali basalt
5736B	5725	69	11.50	52	48.48	Qbb	j	alkali basalt
5817	5712	67	11.22	54	47.08	Qbb	d	alkali basalt
NW SHEET SPECIMENS	VENT	mg	MgO	%An	SiO2	SYMBOL	TYPE*	CHEMICAL LITHOLOGY
5415	5415	66	11.43	59	46.41	QTmb	d	alkali basalt
6412	6412	69	12.01	56	47.33	QTmb	b	alkali basalt
SW SHEET SPECIMENS	VENT	mg	MgO	%An	SiO2	SYMBOL	TYPE*	CHEMICAL LITHOLOGY
0305	0305	67	11.27	53	47.80	Tyb	d	alkali basalt
1301	2335A	68	12.97	63	45.00	QTmb	g	basanitic alkali basalt
2107	2122	67	11.12	74	45.07	Tb	j	basanitic alkali basalt
2110	2110	67	11.04	60	47.32	Tb	j	alkali basalt
2122	2122	67	11.39	92	43.92	Tb	j	melanephelinite
2125	2125B	68	11.62	95	44.20	Tb	j	melanephelinite
2135A	2136A	67	11.17	78	45.34	Tob	j	basanitic alkali basalt
2136	2136A	67	11.42	79	44.75	Tob	j	basanite
3126	3126	69	11.33	55	48.35	Tb	b	alkali basalt
3222	3229	68	11.80	51	48.00	QTmb	b	alkali basalt
3226P	3226A	67	11.79	52	46.57	QTmb	b	basanitic alkali basalt
3228	3226A	67	11.61	52	46.93	QTmb	b	alkali basalt
3235	3226A	65	10.98	58	46.09	QTmb	b	basanitic alkali basalt
4225	4225	66	11.46	55	47.06	QTb	d	transitional basalt
CENTRAL SHEET SPECIMENS	VENT	mg	MgO	%An	SiO2	SYMBOL	TYPE*	CHEMICAL LITHOLOGY
0414B	Vol Can	70	13.95	63	45.10	Tybff	?	basanitic alkali basalt
0414H	Vol Can	68	11.80	71	45.67	Tybi	?	basanitic alkali basalt
0414I	Vol Can	70	13.99	59	46.16	Tybf	?	alkali basalt
2415	2415	69	10.99	53	49.39	QTmb	j	transitional basalt
2530A	2530	69	11.72	53	49.71	QTb	b	subalkali basalt
3424	3424	71	13.53	65	46.44	QTmb	b	alkali basalt
3508B	3508A	66	11.03	63	45.93	QTmb	d	basanitic alkali basalt
3509A	3509	66	11.46	55	46.89	QTmb	d	alkali basalt
3528A	3528	66	10.84	62	45.91	QTmb	b	alkali basalt
EAST SHEET SPECIMENS	VENT	mg	MgO	%An	SiO2	SYMBOL	TYPE*	CHEMICAL LITHOLOGY*
1019	1028	69	12.47	58	47.07	Qbb	a	alkali basalt
1028A	1028	69	12.63	59	46.90	Qbb	a	basanitic alkali basalt
2011	2011	71	12.89	54	47.92	Qbb	j	transitional basalt
2012A	2012	69	11.79	54	48.06	Qbb	j	alkali basalt
2014	2014	69	12.45	56	47.26	Qbb	b	alkali basalt
2023A	2014	68	11.85	55	47.39	Qbb	b	alkali basalt
2024	2024	70	10.74	51	50.27	Qbb	b	transitional basalt
3034	3033	67	11.39	55	47.48	Qbb	j	alkali basalt
3814	3814	69	12.54	65	48.50	Qbb	b	subalkali basalt
3818	3818	70	12.52	57	48.42	Qbb	b	transitional basalt
3927	3922A	67	11.72	69	47.51	Qbb	b	subalkali basalt
4836B	4931	72	14.34	55	48.56	Qbb	a	subalkali basalt

*See lithotypes classification in MF map pamphlets on next page in 5.5b.

5.5b. Lithotypes of primitive lavas, from MF maps:

Type	Number	Name
a	3	picritic basalt*
b	15	clinopyroxene-olivine-phyric basalt
c	0	clinopyroxene-phyric basalt
d	7	olivine-phyric basalt
e	0	plagioclase-phyric basalt
f	0	quartz basalt
g	1	microporphyritic olivine basalt
h	0	aphyric basalt
i	0	slightly porphyritic basalt
j	11	clinopyroxene-rich basalt
?	3	uncertain; analyses are from a project at Volunteer Canyon prior to MF mapping
	40	

*picritic basalts (type a) might have accumulated olivine phenocrysts.

5.5c. Summary of primitive lavas: San Francisco volcanic field:

CHEMICAL LITHOLOGY	ANALYSES	VENT STRUCTURES*	PERCENT OF ANALYSES OF PRIMITIVE LAVAS	PERCENT OF VENT STRUCTURES OF PRIMITIVE LAVAS	PRIMITIVE LAVA VENT STRUCTURES PERCENT OF TOTAL VENT STRUCTURES OF THE LITHOLOGIC TYPE [#]
melanephelinite	2	2	5.0	5.6	100
basanite	1	1	2.5	2.8	16.7
basanitic alkali basalt	9	7	22.5	19.4	20.0
alkali basalt	19	17	47.5	47.2	9.7
transitional basalt	5	5	12.5	13.9	4.9
subalkali basalt	4	4	10.0	11.1	4.8
Total	40***	36**	100	100	

*There are 31 separate vent structures, 5 of which are polygenetic. Volunteer Canyon is counted as one vent structure. Different compositions in one vent structure are counted as separate vent structures.

**8.8 percent of analyzed melanephelinite, basanite, and basalt lavas (408) in San Francisco volcanic field.

***9.8 percent of analyzed melanephelinite, basanite, and basalt lavas (408) in San Francisco volcanic field.